PARTIAL MOLAL VOLUMES OF HYDROCARBON SOLUTIONS IN WATER

BY

WILLIAM LEWIS MASTERTON

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AN ABSTRACT OF A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
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IN THE GRADUATE COLLEGE OF THE
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PARTIAL MOLAL VOLUMES OF HYDROCARBON SOLUTIONS IN WATER

By means of a specially constructed apparatus, the specific gravities of hydrocarbon solutions in water were determined to seven decimal places. From the specific gravities, the partial molal volumes of the hydrocarbons were calculated. Solutions of benzene, methane, ethane, and propane were studied at various temperatures in the range from 10-40 C. All the volumes measured were less than those of the same hydrocarbons in non-polar solvents.

For benzene, this decrease in volume is interpreted on the basis of the abnormally large internal pressure of water. Another factor which could lead to a volume decrease would be complex formation between benzene and water.

With the aliphatic hydrocarbons, there is a compression effect due to the internal pressure of water, as with benzene. Here, however, we also have to consider the presence of icebergs in the solution. The coefficients of expansion of the hydrocarbons in solution are interpreted in terms of the iceberg theory.

The solubility and entropy of solution of benzene are related to its partial molal volume, using Hildebrand's concept of the "regular solution" as a model.

VITA

The author was born on July 24, 1927, in Conway, N. H. He attended elementary and secondary schools in that town. In 1944, he entered the University of New Hampshire. After two years there, he was inducted into the United States Army. Upon his discharge in March of 1947, he returned to college and in 1949 received the degree of Bachelor of Science in Chemistry. The following year he received the degree of Master of Science in Chemistry from the University of New Hampshire.

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